



Run II b Project Status

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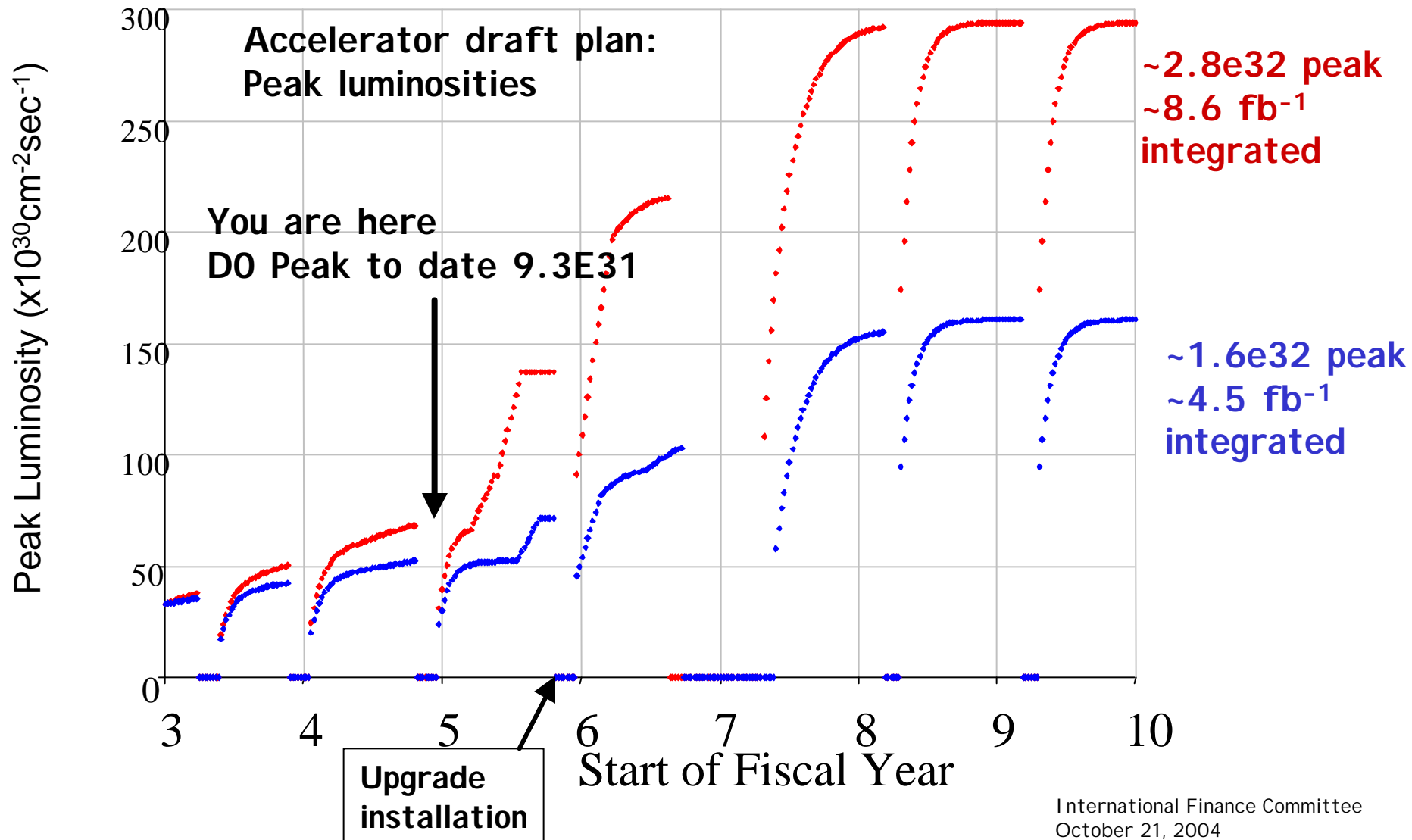


Run II b Upgrade Project

- **Project Status Overview**
 - ◆ Ingredients of the upgrade
 - ◆ Baselined Costs
 - ◆ Management
 - ◆ Upgrade schedule/Milestones
 - ◆ Obligations/ETC
 - ◆ End game – installation/commissioning



Run II b Luminosity Projections





Run II b upgrade

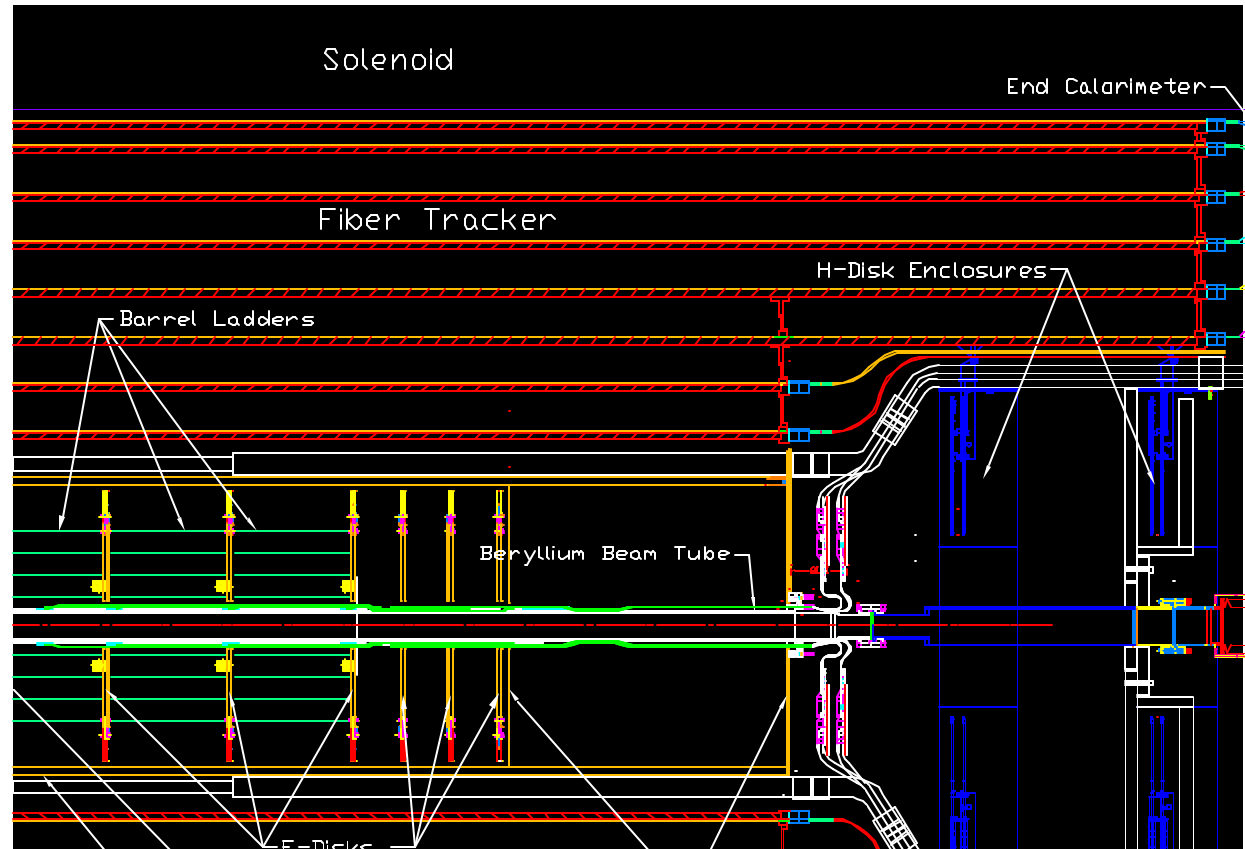
- Project consists of:
 - ◆ New Silicon Layer Zero detector
 - inner layer of silicon
 - Mitigate tracking losses due to radiation damage and detector aging
 - Provide more robust tracking and pattern recognition for higher luminosities
 - Improve impact parameter resolution
 - ◆ Trigger Upgrade
 - Complete upgrade program to keep trigger rates down as luminosity increases
 - L1 upgrades (Calorimeter, Central Track Trigger, Cal Trk-Match)
 - L2 upgrades (Silicon Track Trigger, L2 b processors)
 - New electronics for central fiber tracker (AFE II)
 - Helps tracking efficiency in higher luminosity/occupancy environment
 - Final decision to be made after first full prototype tested - early 2005
 - ◆ DAQ/Online upgrade
 - Upgrade level 3 processing power, database & host servers, control systems



Silicon Layer Ø

Universities on DØ-LØ

Brown
California State, Fresno
CINVESTAV Mexico
Fermilab
University of Illinois Chicago
Kansas State University
Kansas University
Louisiana Tech University
Michigan State University
Moscow State University
Northwestern University
Rice University
University of Rochester
SUNY-Stony Brook
University of Washington



Large NSF MRI grant (~\$700k)
Additional in-kind university support



Run 11b Trigger Upgrade

- Level 1
 - ◆ Calorimeter trigger upgrade
 - sharpens turn-on trigger thresholds
 - more topological cuts
 - ◆ Calorimeter track-match
 - fake EM rejection
 - tau trigger
 - ◆ L1 tracking trigger upgrade (CTT)
 - improved tracking rejection especially at higher occupancies
- Level 2
 - ◆ L2 Processor upgrades for more complex algorithms
 - ◆ Silicon Track Trigger expansion
 - More processing power
 - use trigger inputs from new silicon layer Ø
- New Readout Electronics for Central Fiber Tracker



Central Fiber Tracker readout upgrade (AFE II)

- **AFE II + TriPT will**
 - ◆ Improve noise floor and pedestal stability
 - Better hit efficiency and point resolution
 - ◆ Readout architecture much more flexible
 - Less deadtime
 - ◆ Added functionality of the TriPT (z information)
 - Significant reduction in track reconstruction time
- **R&D for AFE II is going well**
 - ◆ Expect prototype AFE + TRiP early fall
 - First prototype stuffed AFE II boards (+ TRiP) in hand
 - TripT submission late August – back for testing ~now
 - ◆ This part of the project is only conditionally approved
 - Plan to test prototype
 - Hold DØ internal review 12/04
 - If review positive, hold laboratory review early 2005
 - If all reviews positive, then will go ahead with project
- **Have earmarked Run IIb project money for this**
 - \$1.47M + 0.66M Contingency



DAQ/Online

System	Items	Need
Level 3 filter nodes	96 more L3 Farm nodes	Match to rates and processing requirements
DAQ HOST system	Linux data logging nodes and buffer disk arrays	Replace existing systems with higher performance nodes
ORACLE systems	Database nodes, disk arrays, and backup systems	Adopt lab standard ORACLE platform
File Server systems	Linux server nodes, disk arrays, and backup systems	Provide increased storage capacity
Slow Control system	VME processors for control and monitoring of detector	Improve monitoring performance for extended run

Upgrades to DAQ/Online systems required for long-term, high rate running during Run IIb



DZero Run I Ib Upgrade

Project baseline cost profiles



DZero Run I Ib Upgrade

Total Project Costs, burdened AY k\$ as rebaselined January 2004

<i>Obligation Profile in AY k\$</i>	FY01	FY02	FY03	FY04	FY05	FY06	TOTAL
Silicon (incl. G&A and FNAL	17	1326	440	3892	267	0	5942
Trigger (incl. G&A and FNAL	0	330	716	1516	2392	40	4994
Online (incl. G&A and FNAL I	0	0	64	311	377	311	1062
Administration (incl. G&A and	0	0	274	217	225	207	924
Sub Total	17	1656	1494	5935	3261	558	12921
R&D (incl. G&A and FNAL lab	0	1361	2519	0	0	0	3881
Contingency	0	0	0	1582	1354	188	3124
Total Project Cost	17	3017	4014	7518	4615	746	19926
Percentage by FY	0	17	23	29	27	4	

Includes MRI + InKind + R&D over lifetime of the project



DZero Run I Ib Upgrade

Total DOE MIE Costs, burdened AY k\$ as rebaselined January 2004

	<i>MIE Obligations in AY\$ (K)</i>				
	<i>FY03</i>	<i>FY04</i>	<i>FY05</i>	<i>FY06</i>	<i>Total</i>
Silicon	\$0	\$687	\$244	\$0	\$931
Trigger	\$494	\$1,439	\$1,946	\$40	\$3,919
DAQ	\$64	\$311	\$377	\$311	\$1,062
Admin	\$274	\$217	\$225	\$207	\$924
SubTotal	\$832	\$2,654	\$2,791	\$558	\$6,836
Contingency	\$14	\$1,568	\$1,354	\$188	\$3,124
Total	\$846	\$4,222	\$4,145	\$746	\$9,960

Includes AFEI costs: \$1.47M in trigger costs + 0.7M in contingency
This is the rebaselined total for the project

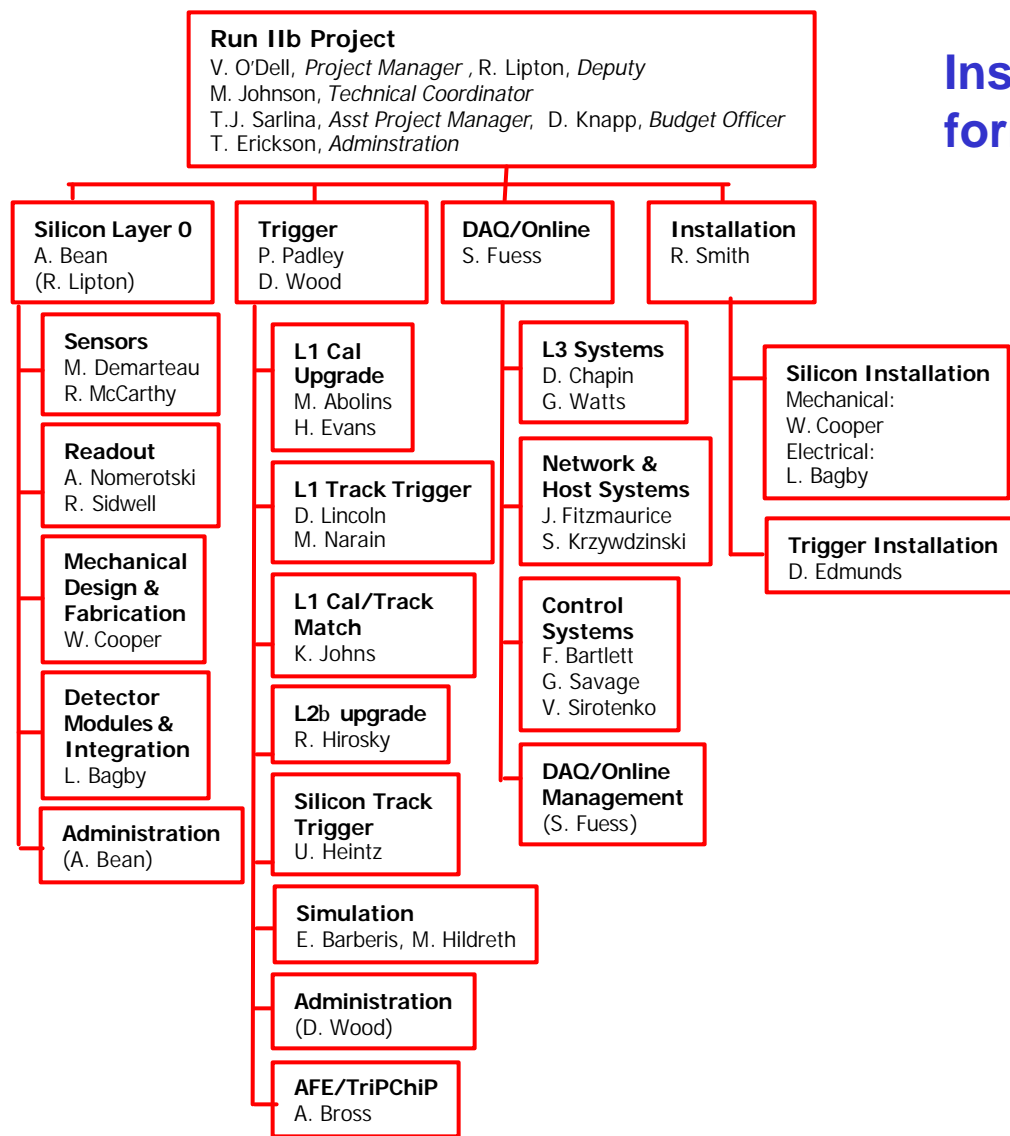


DZero Run I Ib Upgrade

- Management Structure and reporting



Run II b Upgrade Organization



Installation /commissioning not formally part of the project

- Clearly important
- We have a structure in place working on this
- More on this later in this talk
- Project personnel are overseeing installation



Project Reporting

- Vehicles for reporting
 - ◆ Use MS project to track progress of project
 - ◊ Monthly updates by L2/L3 managers
 - ◊ Update % complete/forecast dates
 - ◆ Use parts of COBRA (lab project reporting machinery)
 - ◊ reports actual costs/baseline scheduled value/earned value
 - ◆ Monthly reports
 - ◊ Monthly reports to Lab and DOE management
 - ◊ Include milestones/costs/obligations
 - ◆ Change requests
 - ◊ Generated whenever there is a significant change in project:
 - Schedule
 - Cost
 - Scope



Project Schedule: Director's Milestones

Director's Milestones: Baselined date/Aggressive Date/Current Forecast						
Milestone Description	L2/Director's Baseline (5/04)	Original Forecast (Aggressive) (11/03)	August Forecast (8/04)	L2/Director's Variance (work days)	Variance from Aggressive (work days)	Notes
WBS 1.2 Trigger						
L1 Calorimeter Trigger TAB/GAB Prototyping Complete	05/03/04	03/26/04	05/26/04	18	40	Complete
L1 Trigger Cal-Trk Match Production and Testing Completed	01/03/06	05/16/05	05/16/05	(153)	0	Rebaselined
Start Production TAB Fabrication	02/25/05	10/28/04	10/22/04	(80)	(4)	
L2 Silicon Track Trigger Production and Testing Complete	10/17/05	01/31/05	04/01/05	(138)	42	
L1 Calorimeter Trigger Production And Testing Complete	01/05/06	07/08/05	07/25/05	(108)	10	
L2 Beta Trigger Production And Testing Complete	01/05/06	02/28/05	03/24/05	(193)	20	
L2 Trigger Upgrade Production and Testing Complete	01/05/06	02/28/05	04/01/05	(187)	20	
L1 Central Track Trigger Production And Testing Complete	01/10/06	04/20/05	07/14/05	(118)	55	
L1 Trigger Upgrade Production and Testing Complete	04/10/06	07/08/05	07/25/05	(172)	11	
WBS 1.3 Online/DAQ						
Online System Production and Testing Complete	10/07/05	06/17/05	06/17/05	(78)	0	
WBS 1.6 Layer 0 Silicon Detector						
Freeze Mechanical Parameters	01/06/04	12/16/03	12/15/03	(9)	(1)	Complete
Release Sensors for Production	05/26/04	03/19/04	02/26/04	(63)	(14)	Complete
Release Hybrids for Production	06/04/04	03/26/04	03/25/04	(50)	(1)	Complete
Release Analog Cables for Production	06/04/04	03/26/04	03/19/04	(54)	(5)	Complete
All Analog Cables Delivered and Tested	03/11/05	09/29/04	08/10/04	(141)	(31)	
All Sensors Delivered and Tested	05/23/05	11/17/04	09/28/04	(159)	(36)	
All L0 Hybrids Delivered, Stuffed, and Tested	08/25/05	01/19/05	23/04	(164)	(10)	
All Adapter Cards Delivered and Tested	10/17/05	02/23/05	03/16/05	(165)	15	
Silicon L0 Module Production Complete	11/29/05	03/24/05	02/15/05	(198)	(26)	
Layer 0 Silicon Detector Ready to Move to DAB	05/25/06	07/21/05	07/21/05	(209)	0	



DOE MIE Current Spending Estimate To Completion

DO RI1b EQU - August FY04 IN \$K

Task Number	Expenditure Category	Current Month Total Cost	Current Month Obligation	YTD Total Cost	YTD Obligations w/Indirect	Current PO Open Comm	Current Reqs In Process	Prior Yr Total Cost	Total Project Cost by WBS Level 2
	M&S	51.8	44.1	272.8	213.8	95.6	984.9	28.1	
	SWF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	OH	4.2	0.0	9.2	9.2	0.0	0.0	0.4	
	Total 1.2	56.0	44.1	282.0	223.1	95.6	984.9	28.5	1391.0
	M&S	40.9	0.0	87.7	87.7	0.0	0.0	0.0	
	SWF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	OH	6.6	0.0	14.1	14.1	0.0	0.0	0.0	
	Total 1.3	47.5	0.0	101.8	101.8	0.0	0.0	0.0	101.8
	M&S	1.4	1.4	4.7	4.7	0.0	0.0	1.6	
	SWF	12.2	12.2	142.0	142.0	0.0	0.0	118.3	
	OH	3.9	0.0	43.9	43.9	0.0	0.0	36.2	
	Total 1.4	17.6	13.6	190.6	190.6	0.0	0.0	156.1	346.6
	M&S	4.8	4.8	16.7	21.7	5.0	0.0	0.0	
	SWF	54.9	54.9	268.0	268.0	0.0	0.0	0.0	
	OH	17.4	0.0	83.4	83.4	0.0	0.0	0.0	
	Total 1.6	77.2	59.8	368.2	373.2	5.0	0.0	0.0	373.2
Total Project	M&S	99.0	50.3	381.9	328.0	100.6	984.9	29.7	
	SWF	67.2	67.2	410.0	410.0	0.0	0.0	118.3	
	OH	32.1	0.0	150.6	150.6	0.0	0.0	36.6	
Grand Total		198.3	117.5	942.5	888.6	100.6	984.9	184.6	2212.6

Total Project Cost (Inception To Date) = 1127.1

Total Project Obligations w/Indirect = 2212.6

Total MIE costs through August for rebaselined project Includes PO's & RIPS



Current Spending, ETC

DOE MIE Only

D0 RunI Ib EQU - May FY04 in \$K				
Task Number	Total Project Cost by WBS Level 2	Total BAC by WBS Level 2	ETC (DOE MIE Only)	Comments
1.2 Trigger Upgrade	\$1,391.0	\$2,254.3	\$863.3	
1.3 Online Systems	\$101.8	\$1,001.7	\$899.9	
1.4 Project Admin	\$346.6	\$783.0	\$436.4	
1.6 Layer 0 Silicon	\$373.2	\$886.5	\$513.3	
Grand Total	\$2,212.6	\$4,814.2	\$2,601.6	
MR after AFEII costs	\$2,791.4			
% Contingency to ETC to MIE portion	107%			

- Still large management reserve
 - ◆ Roughly ~75% when compared to TPC ETC, adding in MRI /inkind
 - ◆ Most University PO's in place
 - Some FY05 held up by CR - but no real issue
 - ◆ Need MR for end game!



Installation/Commissioning

- Different kinds of commissioning
 - ♦ Technical commissioning
 - Hardware works, protocol tested, inputs/outputs verified
 - ♦ Physics commissioning
 - System calibrated, understood, efficiencies calculated, all “downstream” software in place and tested
- Project plan includes full system technical commissioning before installation
 - ♦ Some preparatory work is scheduled for the current shutdown
 - Some layer 0 infrastructure installed
 - CTT/L1 Cal infrastructure for pre-installation commissioning
 - ♦ Installation/Commissioning schedule includes all installation and commissioning tasks needed to bring the system up
- Project on track for installation during 2005 shutdown
 - ♦ Flexibility in shutdown scheduling would none the less be prudent
- Physics commissioning includes all tasks associated with simulating/unpacking/monitoring and calibrating the systems
 - ♦ Have formed a collaboration wide committee (SC-IPC) to examine the full physics commissioning phase
 - 1st report just sent to Collaboration
- Have fully resource loaded MPP schedule for installation and commissioning
 - ♦ Gearing up for baselining/statusing as we do with project files



Installation M&S Costs (from MPP)

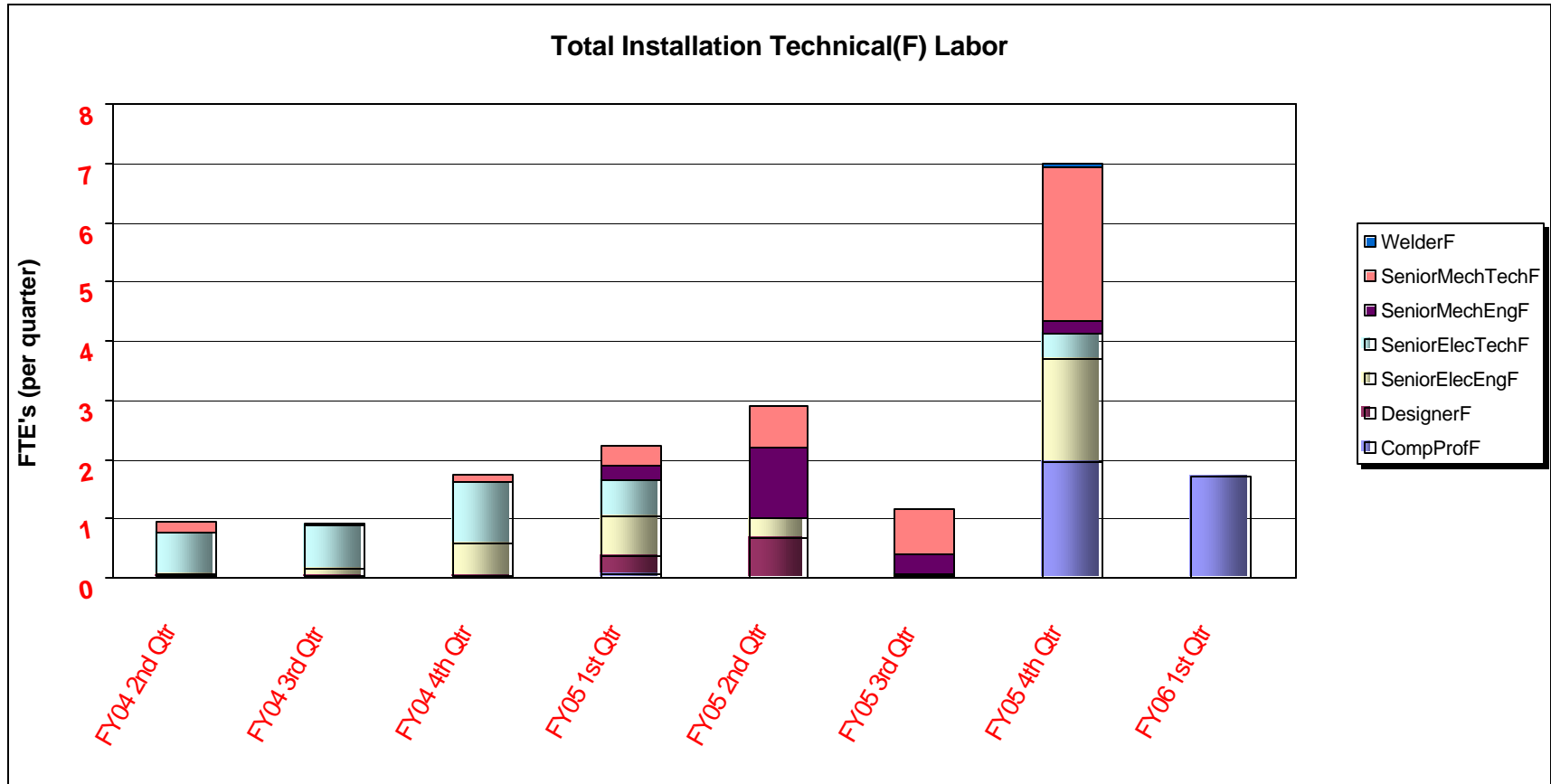
WBS	Task Description	Start	Finish	Funding Source	M&S Cost (\$FY04)
1.5	Run Ilb Installation				
1.5.4	Layer 0 Silicon Installation				
1.5.4.1	Prepare Silicon Infrastructure				
1.5.4.1.1	Prepare L0 Adapter Cards and Mounting	5-Jan-04	5-Jan-05	OP	\$15,000.00
1.5.4.1.3	Refurbish dry gas system	7-Feb-05	1-Apr-05	OP	\$500.00
1.5.4.1.5	Fall 2004 Shutdown				
1.5.4.1.5.1	Label and Test TempMon Cables	30-Aug-04	3-Sep-04	OP	\$500.00
1.5.4.1.5.4	Prepare New LV Power Supply System for L0	26-Jul-04	15-Nov-04	OP	\$7,500.00
1.5.4.1.6	Design, Fabricate, and Test Silicon Transport Fixture	15-Nov-04	14-Dec-04	OP	\$2,500.00
1.5.4.1.7	Design, Fabricate, and Test Silicon Installation Fixture	15-Dec-04	21-Jan-05	OP	\$2,500.00
1.5.4.1.8	Design and Fabricate Silicon Alignment Fixtures	24-Jan-05	18-Feb-05	OP	\$5,000.00
1.5.4.1.9	Design, fabricate and test Beampipe Handling Fixtures	21-Feb-05	4-Mar-05	OP	\$2,500.00
1.5.5	Run Ilb Trigger Installation				
1.5.5.1	Prepare Infrastructure at DAB				
1.5.5.1.1	Prepare new L1 Cal Racks	5-Jan-04	13-Dec-04	OP	\$47,000.00
1.5.5.1.5	Provide for BLS cable re-routing: UIC	26-May-04	21-Jan-05	OP	\$35,000.00
1.5.5.2	Level 1 Calorimeter Trigger				
1.5.5.2.2	Installation And Technical Commissioning				
1.5.5.2.2.2	Engineering Support - MSU	1-Jul-05	2-Sep-05	OP	\$72,000.00
1.5.5.2.2.8	Connect new rack services	25-Jul-05	29-Jul-05	OP	\$2,500.00
1.5.5.3	Level 1 Calorimeter Track Matching				
1.5.5.3.3	L1 Cal/Trk Match Technical Commissioning				
1.5.5.3.3.4	Make L1 latency change	28-Jun-05	30-Jun-05	OP	\$2,000.00
1.5.5.6	L2 Silicon Track Trigger Upgrade				
1.5.5.6.2	L2 STT Installation				
1.5.5.6.2.4	Splitters Install	5-Jan-04	16-Jan-04	OP	\$500.00
	Total M&S				\$195,000.00

Moving L0
fixturing
costs to
project

Moving
trigger racks
& cabling to
project



Installation Effort (from MPP)





Conclusions

- Project is making impressive technical progress
 - ◆ Trigger solidly in prototype testing phase
 - ◊ All major calorimeter trigger boards testing prototypes
 - ◊ Trigger work maintaining a very aggressive schedule
 - ◆ Layer Ø took full advantage of original Run II b R&D and is moving quickly
 - ◊ Milestones are being met on or ahead of schedule
 - ◆ Online systems on schedule
 - ◆ Costs are under control
 - ◊ Tools in place to understand/track them
 - ◆ Full project on schedule for '05 installation
- Installation/Commissioning plans are mature
 - ◆ Pre-installation during 2004 shutdown
 - ◆ Main installation during 2005 summer/fall shutdown
 - ◊ Resource loaded installation schedule exists and is updated as our understanding matures